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EP 0451991 A2

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(54) Loudspeaker system structure for video appliance

(57) A loudspeaker system structure mounted in a video appliance comprising a front enclosure 15 and rear enclosure 16 is disclosed. A sealing member, such as non-woven fabric, sponge, or the like, is provided to engaging portions of the front enclosure and the rear enclosure to prevent leakage of sounds and vibration. The structure further comprises sound outlets 17 formed on the front enclosure for discharging sound reproduced from a woofer, and high-frequency sound outlets 23a for discharging high-frequency sounds reproduced from the tweeter.

FIG. 2

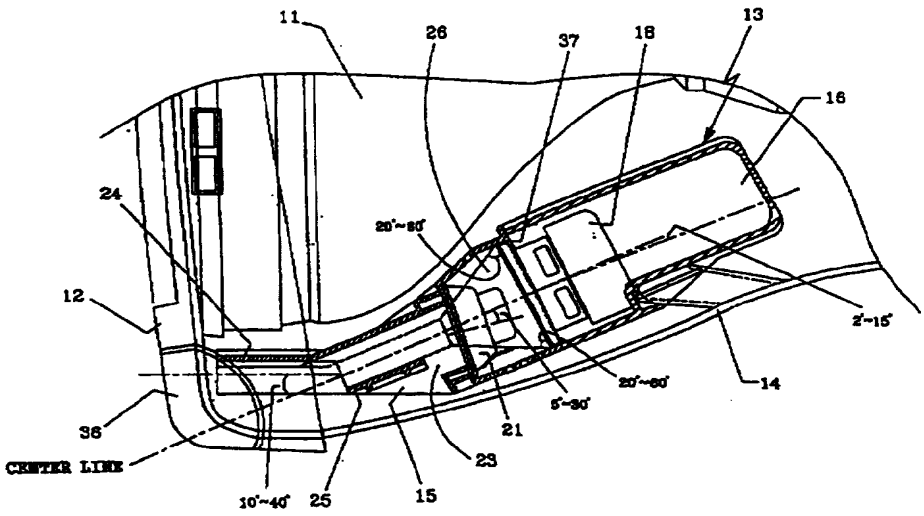

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FIG. 1

(PRIOR ART)

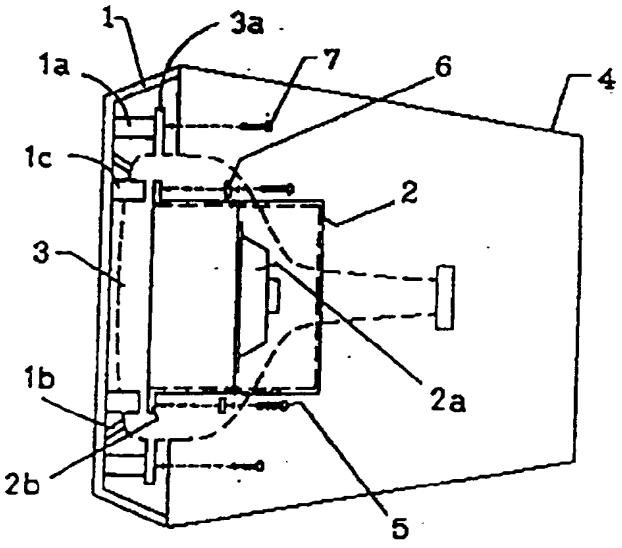


FIG. 2

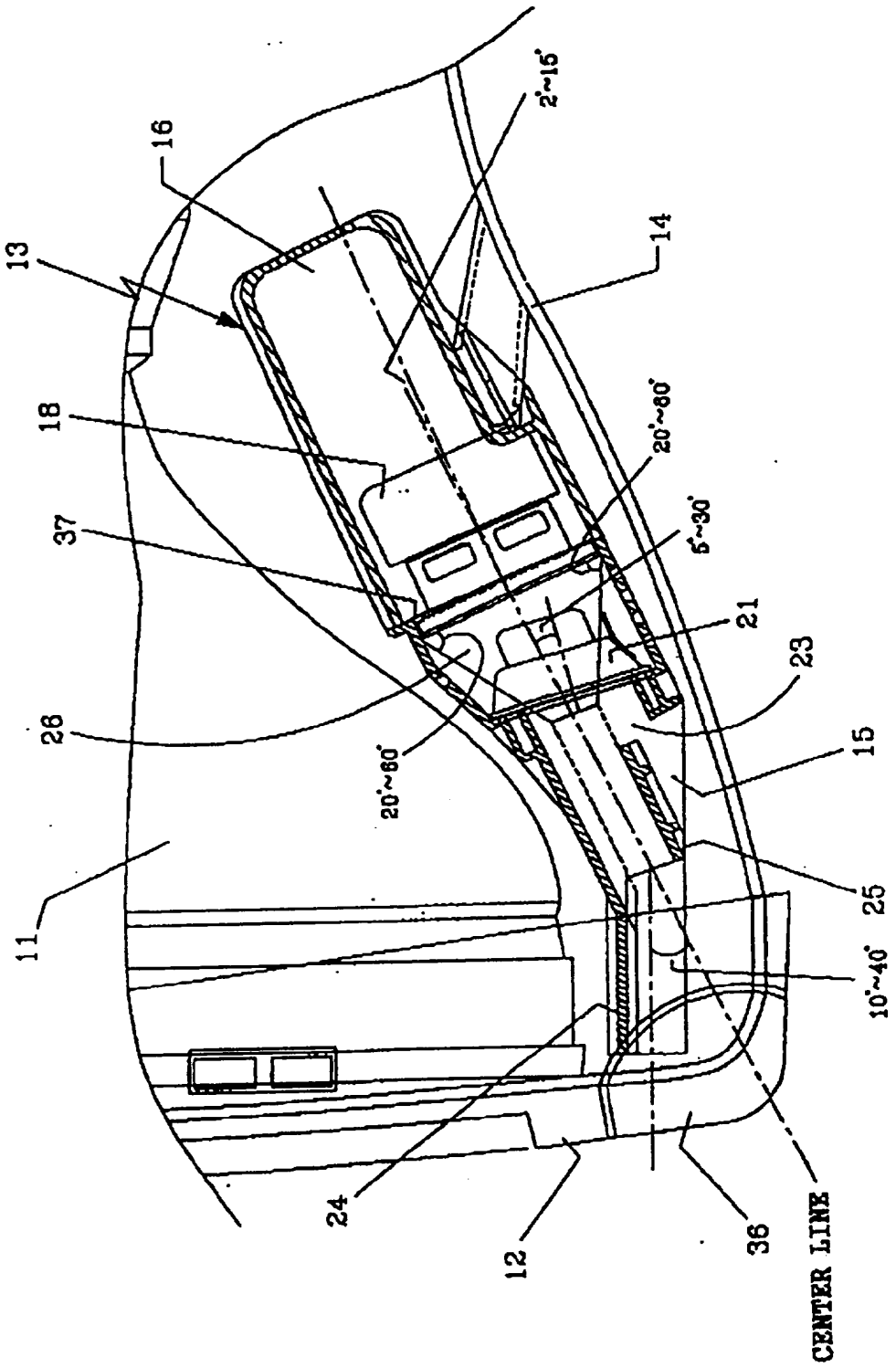

2°~15°
16
13
14
18
20°~60°
37
5°~30°
21
23
28
20°~60°
15
11
25
10°~40°
24
12
36
CENTER LINE

FIG. 3

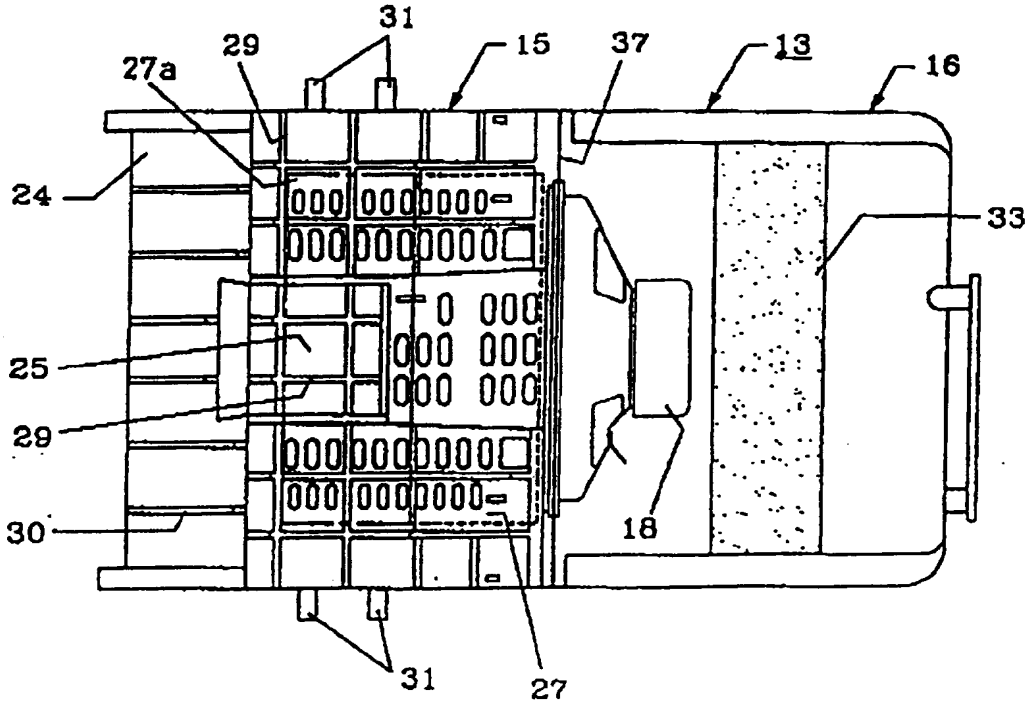

31
29
15
37
13
16
27a
24
33
25
29
30
18
31
27

FIG. 4

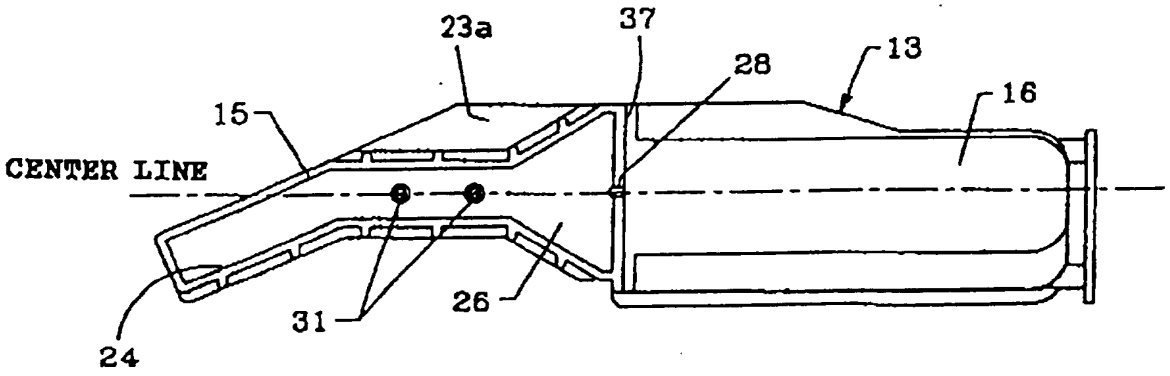

23a
37
28
13
16
15
CENTER LINE
31
26
24

FIG. 5

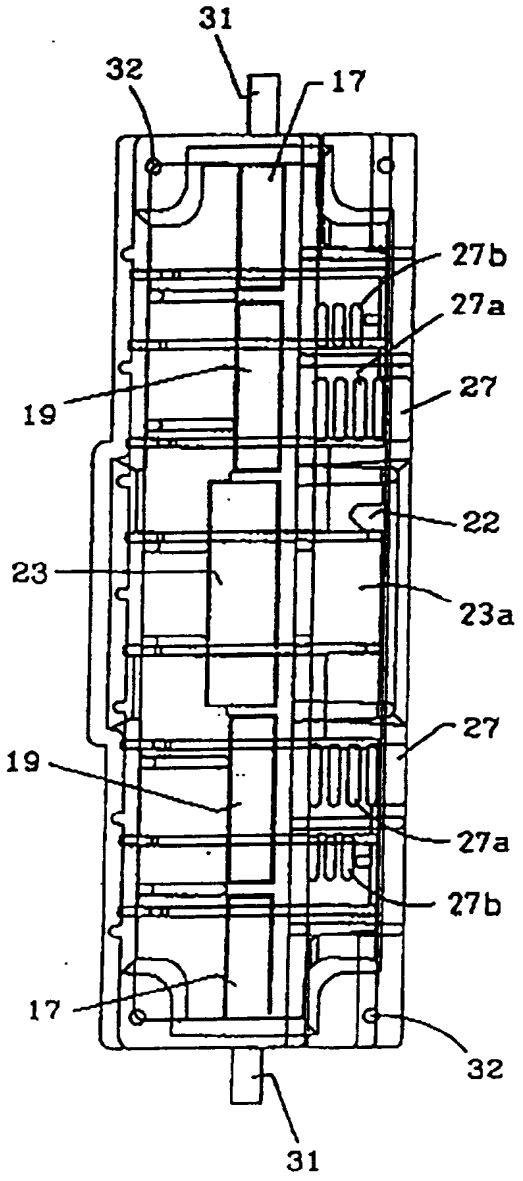


FIG. 6

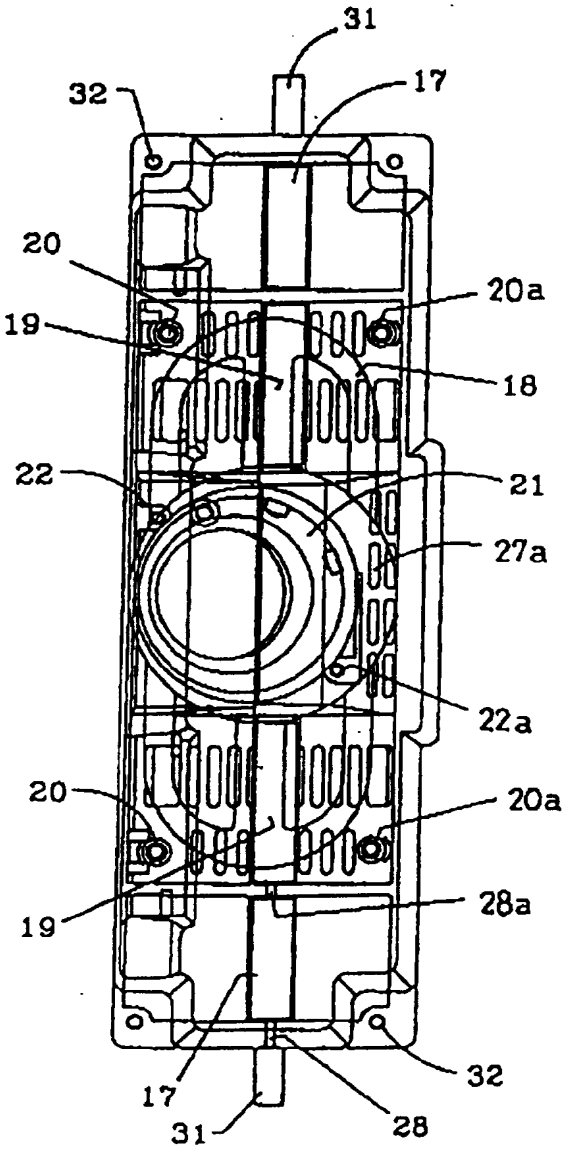


FIG. 7

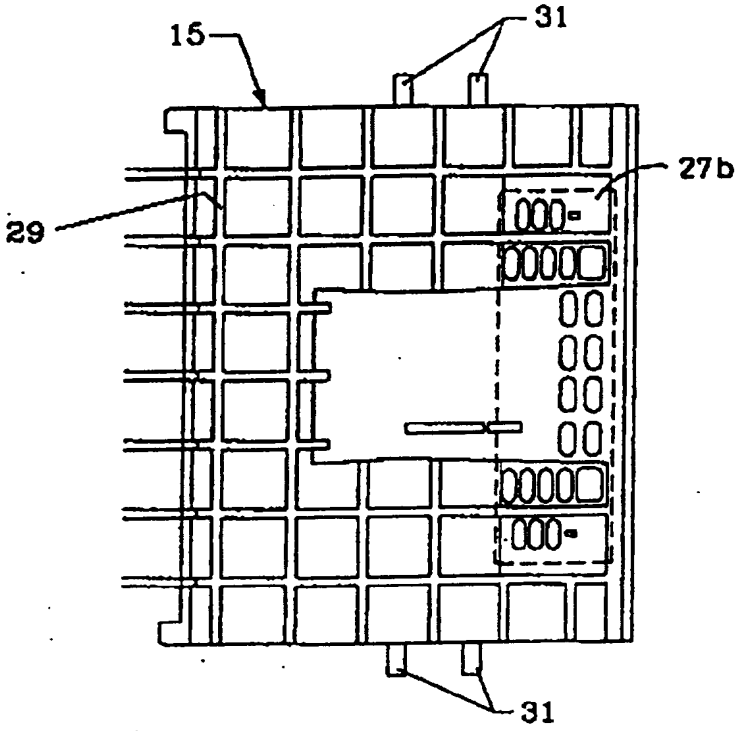


FIG. 9

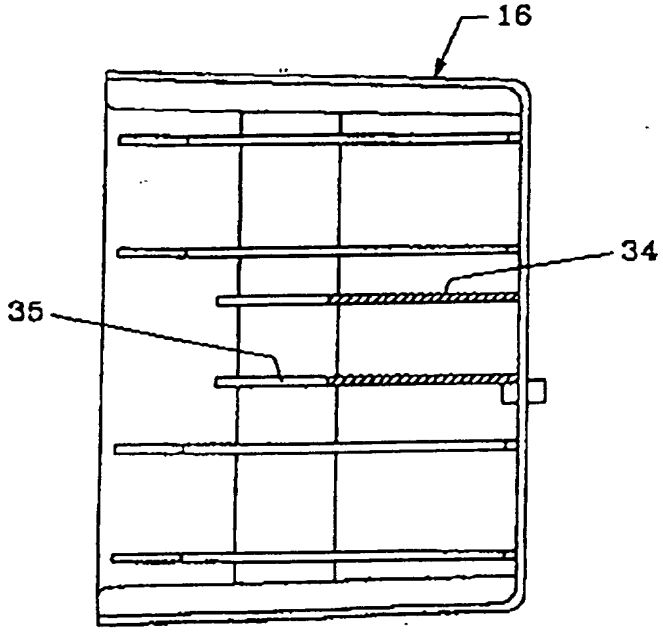
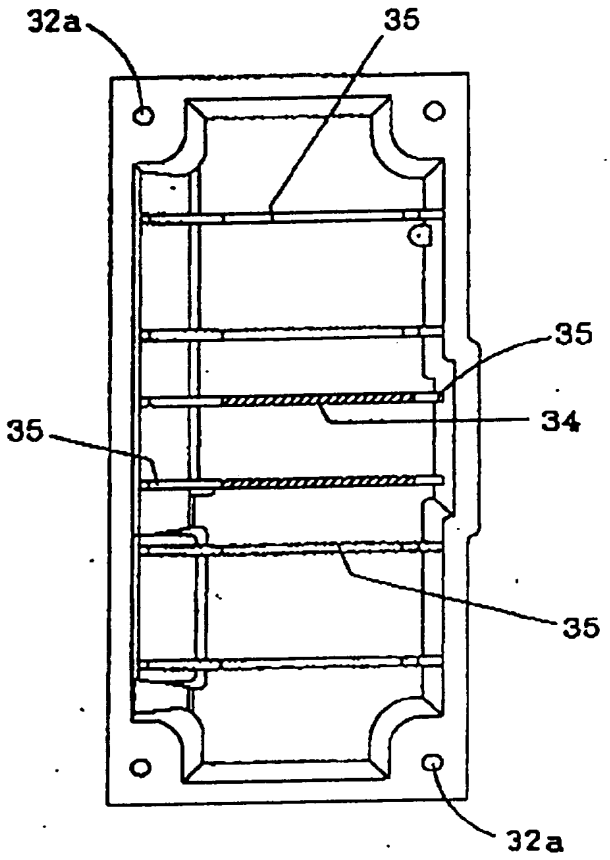


FIG. 8



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DOME LOUDSPEAKER SYSTEM STRUCTURE FOR VIDEO APPLIANCE

The present invention relates generally to a structure of a loudspeaker system for a video appliance. In particular, the invention relates to a structure of a dome loudspeaker system capable of preventing the shadow mask of a cathode ray tube from being vibrated by the dome loudspeaker system attached to the host appliance, and improving the quality of sounds reproduced from the dome loudspeaker system.

The conventional video appliance into which loudspeakers are mounted comprises, as can be seen in FIG. 1, a cabinet 1, a loudspeaker enclosure 2 for protecting and supporting the loudspeaker, a cathode ray tube 3 screwed or otherwise fixed to the cabinet 1, and a back cover 4 for protecting the CRT 3.

The cabinet 1 comprises a number of threaded bosses 1a protruding from the inner surface thereof for supporting the CRT 3 in the cabinet 1. An escutcheon 1b contacts with the front surface of the CRT 3. A number of threaded bosses 1c are positioned close to the CRT engaging bosses 1a. Bosses 1c protrude from the inner surface for supporting the loudspeaker system 2 fixed by means of screws. The loudspeaker system 2 includes threaded holes 2b at its upper and lower sides. The holes 2b are aligned with the loudspeaker system threaded bosses 1c protruding from the inner surface of the cabinet 1.

With the arrangement as described above, in order to mount the loudspeaker into the video appliance, the CRT 3 is placed on the escutcheon 1b formed on the inside of the cabinet 1. The lugs 3a formed on the front outer portion of the CRT 3 are then positioned opposite to the CRT engaging bosses 1a protruding from the inside of the cabinet 1 and mounted on them by means of screws 7, so that the CRT 3 is mounted in the cabinet 1. The loudspeaker system 2 to which loudspeaker 2a is also coupled is fixed to the cabinet 1.

Because the loudspeaker system 2 has on its upper and lower sides protrusions formed with threaded holes 2b, after the loudspeaker system engaging bosses 1c are aligned with the threaded holes 2b on the upper and lower side of the loudspeaker system 2, the loudspeaker 2 is fixed to the cabinet 1 by means of screws 5. The back cover 4 is coupled to the cabinet 1 in order to protect the CRT 3 and the loudspeaker system 2.

When the conventional video appliance mounted with the loudspeaker operates, however, the loudspeaker 2a connected to the loudspeaker system 2 reproduces sounds, which cause vibration. The produced sound vibration is transferred to the loudspeaker system engaging bosses 1c on the inside of the cabinet 1 via the screws 5, and then to the entire cabinet 1.

The sound vibration transferred to the cabinet 1 is transferred to the lugs 3a of the CRT through the CRT engaging bosses 1a, and to the CRT 3 via the escutcheon

1b formed on the inside of the cabinet 1, so that the shadow mask positioned in the CRT 3 vibrates. This results in the well known `howling' phenomenon. Also, the quality of sounds produced from the loudspeaker 2a mounted inside the loudspeaker system 2 is degraded by the sound vibration described above.

In order to solve the above problems, one object of the present invention is to provide a loudspeaker system structure mountable on the inside of the video appliance capable of preventing the howling phenomenon.

Another object of the present invention is to provide a loudspeaker system structure of the video appliance capable of improved quality of sound production.

The invention is defined in the accompanying independent claims. Some preferred features are recited in the dependent claims.

In order to achieve the above objects, according to one aspect of the present invention, a loudspeaker system structure mounted in a video appliance comprises a loudspeaker system including a front enclosure and rear enclosure which are closely engaged with each other, the front and rear enclosures protecting and supporting a woofer and tweeter mounted inside thereof, sounds reproduced from the woofer and the tweeter being harmonized by the loudspeaker system and discharged outwardly through grills adhered to both sides of a cabinet.

When the front enclosure and the rear enclosure are engaged closely to each other, a sealing member, such as non-woven fabric, sponge, or the like, is arranged between engaging portions of the front

enclosure and the rear enclosure to prevent leakage of sound and vibration causing energy.

According to another aspect of the present invention, a loudspeaker system structure mounted into a video appliance comprises back sound outlets formed on both sides of a front enclosure for discharging a back sound reproduced from a woofer, low-frequency sound front-orienting outlets formed inside the back sound outlets for discharging low-frequency sounds reproduced from the woofer, and high-frequency sound front-orienting outlets formed on an inside of the low-frequency front-orienting outlet for discharging high-frequency sounds reproduced from a tweeter.

The front enclosure formed with the back sound outlets, and the low and high-frequency sound front-orienting outlets may include reinforcing bosses for preventing the front enclosure from being deformed by sound vibration and for maintaining structural strength.

According to a further aspect of the present invention, a loudspeaker system structure mounted into a video appliance comprises back sound outlets formed on both sides of a front enclosure for discharging a back sound reproduced from a woofer, low-frequency sound front-orienting outlets formed inside the back sound outlets for discharging low-frequency sounds reproduced from the woofer, high-frequency sound front-orienting outlets formed on an inside of the low-frequency front-orienting outlet for discharging high-frequency sounds reproduced from a tweeter, a guide plate for guiding sounds discharged through the back sound outlet and low and high-frequency sound front-orienting outlets, and an auxiliary guide plate for guiding a part of

high-frequency sounds discharged from the high-frequency sound front-orienting outlet.

The guide plate for guiding sounds discharged through the back sound outlet and low and high-frequency sound front-orienting outlets may be disposed at an angle of 10 degrees to 40 degrees to a center line of the loudspeaker system to restrict progression of sounds toward a cathode ray tube.

According to yet another aspect of the present invention, a loudspeaker system structure mounted in a video appliance comprises back sound outlets formed on both sides of a front enclosure for discharging a back sound reproduced from a woofer, low-frequency sound front-orienting outlets formed an inside of the back sound outlets for discharging low-frequency sounds reproduced from the woofer, high-frequency sound front-orienting outlets formed on an inside of the low-frequency front-orienting outlet for discharging high-frequency sounds reproduced from a tweeter, and a sound collecting portion for collecting front-orienting sounds and back sounds reproduced from a woofer, a front outside of the sound collecting portion being provided with a plurality of sound compensating portions to compensate the quality of low-frequency reproduced from the woofer.

The sound compensating may comprise a first tone quality compensating section having a plurality of spaced apertures to compensate the quality of sounds reproduced from the woofer in such a manner that the apertures are formed in the proportion of 10 to 30% of an interior surface area of the sound collecting portion, a second tone quality compensating section having a plurality of spaced apertures in such a manner that the apertures

are formed in the proportion of 10 to 20% of the interior surface area of the sound collecting portion, and, a third tone quality compensating section having a number of apertures in such a manner that the apertures are formed in proportion of 5 to 25% of the interior surface area of the sound collecting portion.

The first, second and third tone quality compensating sections can be formed, for example, in the shape of a circle or a rectangle.

A loudspeaker system structure according to the invention mounted in a video appliance may comprise a plurality of woofer fixing bosses for coupling a woofer to a rear of a front enclosure, in which one side of bosses have heights higher than that of the other side, and the woofer is provided in the front enclosure at an angle. Preferably, the slope angle of the woofer to a center line of the loudspeaker system is in a range of 2 degrees to 15 degrees.

In one form of the present invention, a loudspeaker system structure mounted in a video appliance comprises a plurality of tweeter fixing bosses for coupling a tweeter to a front enclosure, in which one side of bosses have heights lower than that of the other side, and the tweeter is provided in the front enclosure at an angle. Preferably, the slope angle of the tweeter to the center line of the loudspeaker system is in a range of 5 degrees to 30 degrees.

In another form of the present invention, a loudspeaker system structure mounted in a video appliance, comprises a tweeter and a woofer mounted to a front enclosure, in which the tweeter and the woofer are staggered to a center line

of the loudspeaker system. The back sound outlet has on both sides lead wire inlets to draw out lead wires of the tweeter and the woofer.

Also according to the present invention, a loudspeaker system structure mounted in a video appliance comprises a partition for preventing sound absorbing material from moving, and a protrusion for preventing a rear enclosure from being deformed by sound vibration, which partition and protrusion are formed on an interior of the rear enclosure for maintaining the structure strength thereof.

In the present invention, when a woofer mounted to a rear portion of a front enclosure reproduces low-frequency sounds, the woofer may reproduce back sounds, noise components of the back sounds being absorbed by a sound-absorbing material inserted to a back side of the woofer which is mounted to an interior of the front enclosure, for absorbing noise components of back sounds, while good quality back sounds are discharged outwardly through a guide plate and an outlet .

In another form of the present invention, a loudspeaker system structure mounted in a video appliance comprises a triangular sound collecting portion formed over a back sound outlet and low/high-frequency sound outlets or formed over low-frequency sound outlet for collecting front-orienting sounds and back sounds reproduced from a woofer mounted to a rear portion of a front enclosure. The inside angle of the sound collecting portion may be in a range of 20 degrees to 60 degrees.

The above objects, other aspects, and advantages of the invention will become apparent by describing the preferred embodiment thereof with reference to the accompanying drawings, in which:

FIG. 1 is a cross-sectional view illustrating the engaged state of the loudspeaker system mounted in the video appliance according to the prior art;

FIG. 2 is a partially cross-sectional view illustrating the structure of the engaged portion of the video appliance and the loudspeaker system according to one preferred embodiment of the present invention;

FIG. 3 is a front view illustrating the engaged state of the dome loudspeaker system according to the embodiment of the present invention;

FIG. 4 is a top plan view illustrating the engaged state of the dome loudspeaker system according to the embodiment of the present invention;

FIG. 5 is a front view illustrating in detail the structure of the front enclosure of the dome loudspeaker system according to the embodiment of the present invention;

FIG. 6 is a rear view illustrating in detail the structure of the front enclosure of the dome loudspeaker system according to the embodiment of the present invention;

FIG. 7 is a rear view illustrating the structure of the front enclosure of the dome loudspeaker system according to the embodiment of the present invention;

FIG. 8 is a detail view illustrating the interior structure

of the rear enclosure of the dome loudspeaker system according to the embodiment of the present invention; and

FIG. 9 is a cross-sectional view illustrating the structure of the rear enclosure of the dome loudspeaker system according to the embodiment of the present invention.

Referring now to FIG. 2, a video appliance comprises a cabinet 12 for protecting and supporting a cathode ray tube 11, one or more dome loudspeaker system 13 connected to both sides of the cabinet 12 for protecting and supporting the loudspeakers, and a back cover connected to the rear side of the cabinet 12 for protecting the CRT 11 and the dome loudspeaker system 13.

In the embodiment shown in FIGs. 5 to 9, the dome loudspeaker system 13 comprises a front enclosure 15 formed on the front side thereof and a rear enclosure 16 engaged closely to the rear side of the front enclosure 15. A sealing member 37, such as non-woven fabric, sponge, or the like is provided between the front enclosure 15 and the rear enclosure 16 to inhibit the leakage of sounds and the production of abnormal sounds by structural vibration. In the embodiment shown, both sides of the members are applied with an adhesive.

Also, the dome loudspeaker system according to the present invention comprises a woofer 18 and a tweeter 21 mounted respectively on the inside of the front enclosure 15. In the context of this application the woofer 18 is any type of speaker capable of producing low-frequency sounds and the tweeter 21 is any type of speaker capable of producing relatively higher frequency sounds.

The front enclosure 15 includes back sound outlets 17 (see FIG. 5) for discharging outwardly a back sound reproduced from the woofer 18, low-frequency sound front orienting outlets 19 for discharging outwardly low-frequency sounds reproduced from the woofer 18, and high-frequency sounds front orienting outlets 23 and 23a for discharging outwardly high-frequency sounds reproduced from the tweeter 21. The front enclosure 15 also includes a number of bosses 20 and 20a for securing the woofer 18 and a number of bosses 22 and 22a for securing the tweeter.

The front enclosure 15 is provided with a guide plate 24 for guiding sounds discharged through the low and high-frequency sound front-orienting outlets 19 and 23 and an auxiliary guide plate 25 for guiding a part of high-frequency sounds discharged from the high-frequency sound front-orienting outlet 23a.

In order to collect the front-orienting sounds and the back sounds reproduced from the woofer 18, the rear side of the front enclosure 15 is provided with a sound collecting portion 26 in the shape of a triangle with the inside angles of 20° to 60°. The front side of the sound collecting portion 26 is provided on the outer surface thereof with first tone quality compensating sections 27 having a number of spaced apertures to compensate for the quality of sounds reproduced from the woofer 18 in such a manner that the apertures are formed in the proportion of 10 to 30% of the interior surface area of the sound collecting portion 26, in the embodiment shown in FIGs 3 and 6. The low-frequency front-orienting outlet 19 and the high-frequency front-orienting outlet 23a are on the outer surface thereof provided with second tone quality compensating sections 27a having a number of spaced

apertures in such a manner that the apertures are formed in the proportion of 10 to 20% of the interior surface area of the sound collecting portion 26, as shown in FIG. 5. And, the rear side of the low-frequency front-orienting outlet 19 is provided with third tone quality compensating sections 27b having a number of apertures in such a manner that the apertures are formed in proportion of 5 to 25% of the interior surface area of the sound collecting portion 26.

In order to draw out the lead wires of the tweeter 21 and the woofer 18, the back sound outlet 17 has on both sides lead wire inlets 28 and 28a. The interior surface of the front enclosure is formed with a number of reinforcing protrusions 29 to maintain the structural strength of the front enclosure 15 and to prevent the front enclosure 15 from being vibrated by sounds reproduced from the loudspeaker. The guide plate 24 for guiding sounds discharged through the back sound outlet 17 and the low/high-frequency front-orienting outlets 19 and 23 has a number of reinforcing webs 30 to maintain rigidity as shown in FIG. 3.

The dome loudspeaker system according to the present invention comprises bosses 31 for fixing the dome loudspeaker system 13 to both sides of the cabinet, threaded holes 32 and 32a for closely connecting the front and rear enclosures 15 and 16, a sound-absorbing material 33 inserted to the back side of the woofer 18 mounted to the interior of the front enclosure 15, for absorbing noise components of back sounds, a portion 34 for supporting or reinforcing the sound-absorbing material 33, and a reinforcing web 35 for preventing the rear enclosure 16

from being deformed by the sound vibration and maintaining the structural strength of the rear enclosure 16.

Referring to FIGs. 2 to 9, in the dome loudspeaker system which comprises the front enclosure 15 and the rear enclosure 16 and protects and supports loudspeakers coupled to both sides of cabinet 12 according to the present invention, the tweeter 21 for reproducing high-frequency sounds is positioned on the bosses 22 and 22a formed on the inside of the front enclosure 15, and in turn they are fastened by means of screws. The woofer 18 for reproducing low-frequency sounds is positioned on the bosses 20 and 20a formed on the inside of the front enclosure 15, and in turn they are fastened by means of screws.

Because the tweeter fixing bosses 22 and 22a for the tweeter 21 have different heights, the tweeter is provided in the front enclosure 15 at an angle within a range 5° to 30° to the center line shown in FIG. 2. Also, because the woofer fixing bosses 20 and 20a have different heights, the woofer is provided in the front enclosure 15 at an angle within a range of 2° to 15° to the center line shown in FIG. 2.

Accordingly, the tweeter 21 and the woofer 18 are staggered along the center line of the loudspeaker system. The lead wires of the tweeter 21 and the woofer 18 are led out through lead wire ports 28 and 28a formed in the dome loudspeaker system.

With the lead wires of the loudspeaker led out, the woofer 18 reproduces low-frequency sounds. In order to absorb the bad tone which is caused by reflection and interferences of the back sounds produced from the

woofer 18, the sound absorbing material 33 which is made of compressed soft fabric or textile is inserted into the supporting partition 34 formed on the inside of the rear enclosure 16.

Also, after the engagement of the tweeter 21 and the woofer 18 to the front enclosure 15 has been completed, the front enclosure 15 is aligned with the rear enclosure 16, and the screws are threaded into the holes 32 formed on the front enclosure 15 and holes 32 formed on the rear enclosure.

At this time, the front enclosure 15 and the rear enclosure 16 are held closely together by screws. If the sealing member 37 is adhered between the front enclosure 15 and the rear enclosure 16, the howling of the front enclosure 15 and the rear enclosure 16, which occurred when the dome loudspeaker system reproduces sounds, can be prevented. The sounds reproduced from the dome loudspeaker 13 can not leak from the join between the front and rear enclosures 15 and 16.

The front of the sound collecting portion 26 is provided on the outer surface with first tone quality compensating sections 27, the low-frequency front-orienting outlet 19 and the high-frequency front-orienting outlet 23a are on the outer surface thereof provided with second tone quality compensating sections 27a, and the rear side of the low-frequency front-orienting outlet 19 is provided with third tone quality compensating sections 27b. With the above construction, the quality of the sounds reproduced from the woofer 18 can be substantially compensated, so that the superior quality of the sounds can be discharged outwardly through the dome loudspeaker

system.

In particular, when the low-frequency sounds reproduced from the woofer 18 are compensated through the first, second and third compensating sections 27, 27a, and 27b and are discharged outwardly, at the sound collecting portion 26 formed on the backside of the front enclosure 15, the front-orienting sounds and back sounds reproduced from the woofer 18 are collected as well as compensated.

Accordingly, the front-orienting sounds and the back sounds reproduced from the woofer 18 and collected at the sound collecting portion 26 are discharged outwardly through the low-frequency front-orienting outlet 19.

The end of the front enclosure 15 is provided with a guide plate 24 which is slanted in a range of 10° to 40°. When the sound is discharged through the low-frequency sound front-orienting outlet 19, the low-frequency sound discharged from the outlet 19 is guided by the guide plate 24 to discharge through the loudspeaker grill 36 detachably fixed to the cabinet 12, and the sound is prevented from moving toward the CRT 11. Accordingly, the shadow mask inside the CRT 11 will not be vibrated so that the howling phenomenon is prevented.

Meanwhile, when the high directional tweeter 21 mounted to the inside of the front enclosure 15 reproduces the high-frequency sounds, the reproduced high-frequency sounds are discharged outwardly through the high-frequency sound front-orienting outlets 23 and 23a.

Also, when some sounds are discharged through the high-frequency sound front-orienting outlet 23, the guide plate

24 provided at the end of the front enclosure 15 guides high-frequency sounds discharged from the outlet 23 to discharge through the loudspeaker grill 36 detachable fixed to the cabinet 12, and are prevented from moving toward the CRT 11. Accordingly, the shadow mask inside the CRT 11 will not be vibrated so that the howling phenomenon is prevented. Also, the remainder of high-frequency sounds reproduced from the tweeter 21 are compensated through the outlet 23a, and discharged outwardly through the grill 36 to the auxiliary guide plate 25 formed on the front enclosure 15.

In particular, when the tweeter 21 reproduces the high-frequency sounds, by the guide plate 24 and the auxiliary guide plate 25 formed on the front enclosure 15, the high-frequency sounds reproduced from the tweeter 21 can be obstructed from discharging toward the shadow mask of the CRT 11 without changing the quality of the sound and discharged outwardly through the loudspeaker grill 36.

As described above, when the sounds reproduced from the tweeter 21 and the woofer are discharged outwardly, the front and rear enclosures 15 and 16 can maintain its structural strength to prevent their shape from deforming, by the reinforcing webs 29 formed on the outside of the front enclosure 15 and the reinforcing webs 35 formed on the inside of the rear enclosure 16.

With the dome loudspeaker system mounted inside the video appliance, the vibration by the sound output can be absorbed and can not be transferred to the CRT, thereby preventing the howling phenomenon. Accordingly, a video appliance adapted to the present invention can utilize large output amplifiers and

loudspeakers, and have improved quality of reproduced sound from the tweeters and the woofers inside the dome loudspeaker.

While the present invention has been described and illustrated herein with reference to the preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the invention.

CLAIMS

1. A loudspeaker system structure for mounting in a video appliance, comprising:

a speaker cabinet formed of a front enclosure and rear enclosure which are closely engaged with each other, the front and rear enclosures protecting and supporting a woofer and a tweeter mounted inside thereof, sounds reproduced from the woofer and the tweeter being harmonized by the loudspeaker system and discharged outwardly through grills adhered to both sides of the cabinet.

2. A loudspeaker system structure as claimed in claim 1, including a sealing member, such as non-woven fabric, sponge, or the like, the sealing member being arranged between engaging portions of the front enclosure and the rear enclosure to prevent leakage of sounds and vibration.

3. A loudspeaker system structure for mounting in a video appliance, comprising:

back sound outlets formed on both sides of a front enclosure for discharging a back sound reproduced from a woofer, low-frequency sound front-orienting outlets formed inside of the back sound outlets for discharging low-frequency sounds reproduced form the woofer, and high-frequency sound front-orienting outlets formed on an inside of the low-frequency front-orienting outlet for discharging high-frequency sounds reproduced from a tweeter.

4. A loudspeaker system structure as claimed in claim 3, wherein the front enclosure formed with the back sound outlets, and the low and high-frequency sound front-orienting outlets include reinforcing members for preventing the front enclosure from being

deformed by sound vibration and for maintaining structural strength.

5. A loudspeaker system structure mounted in a video appliance, comprising:

back sound outlets formed on both sides of a front enclosure for discharging back sound reproduced from a woofer, low-frequency sound front-orienting outlets formed inside the back sound outlets for discharging low-frequency sounds reproduced from the woofer, high-frequency sound front-orienting outlets formed inside the low-frequency front-orienting outlet for discharging high-frequency sounds reproduced from a tweeter, a guide plate for guiding sounds discharged through the back sound outlet and low and high-frequency sound front-orienting outlets, and an auxiliary guide plate for guiding a part of high-frequency sounds discharged from the high-frequency sound front-orienting outlet.

6. A loudspeaker system structure as claimed in claim 5, wherein the guide plate for guiding sounds discharged through the back sound outlet and low and high-frequency sound front-orienting outlets are disposed at an angle of 10 degrees to 40 degrees to a center line of the loudspeaker system to restrict progression of sounds toward a cathode ray tube.

7. A loudspeaker system structure mounted into a video appliance, comprising:

back sound outlets formed on both sides of a front enclosure for discharging a back sound reproduced from a woofer, low-frequency sound front-orienting outlets formed inside the back sound outlets for discharging low-frequency sounds

reproduced from the woofer, high-frequency sound front-orienting outlets formed on an inside of the low-frequency front-orienting outlet for discharging high-frequency sounds reproduced from a tweeter, and a sound collecting portion for collecting front-orienting sounds and back sounds reproduced from a woofer, a front outside of the sound collecting portion being provided with a plurality of sound compensating portions to compensate the quality of low-frequency reproduced from the woofer.

8. A loudspeaker system structure as claimed in claim 7, wherein the sound compensating portions comprise a first tone quality compensating section having a plurality of apertures arranged to compensate the quality of sounds reproduced from the woofer in such a manner that the apertures form in proportion 10 to 30% of an interior surface area of the sound collecting portion, a second tone quality compensating section having a plurality of apertures arranged forming in proportion 10 to 20% of the interior surface area of the sound collecting portion, and, a third tone quality compensating section having a number of apertures forming in proportion 5 to 25% of the interior surface area of the sound collecting portion.

9. A loudspeaker system structure as claimed in claim 8, wherein the first, second and third tone quality compensating sections are formed in the shape of a circle or a rectangle.

10. A loudspeaker system structure mounted in a video appliance, comprising: a plurality of woofer fixing bosses for coupling a woofer to a rear of a front enclosure, in which one side of bosses have heights greater than that of the other side, and the woofer

is provided in the front enclosure at a non-square angle.

11. A loudspeaker system structure as claimed in claim 10, wherein slope angle of the woofer to a center line of the loudspeaker system is in a range of 2 degrees to 15 degrees.

12. A loudspeaker system structure mounted in a video appliance, comprising:

a plurality of tweeter fixing bosses for coupling a tweeter to a front enclosure, in which one side of bosses have heights less than that of the other side, and the tweeter is provided in the front enclosure at an angle.

13. A loudspeaker system structure as claimed in claim 12, wherein slope angle of the tweeter to the center line of the loudspeaker system is in a range of 5 degrees to 30 degrees.

14. A loudspeaker system structure mounted in a video appliance, comprising:

a tweeter and a woofer mounted to a front enclosure, in which the tweeter and the woofer are staggered relative to a center line of the loudspeaker system.

15. A loudspeaker system structure as claimed in claim 14, wherein the back sound outlet has on both sides lead wire inlets for lead wires of the tweeter and the woofer.

16. A loudspeaker structure for mounting in a video appliance, comprising:

front and rear enclosures;

a partition for preventing sound absorbing material from moving; and

a member for preventing the rear enclosure from being deformed by sound vibration, which partition and member are formed on an interior of the rear enclosure for maintaining

the structural strength thereof.

17. A loudspeaker system structure mounted in a video appliance, wherein when a woofer mounted to a rear portion of a front enclosure reproduces low-frequency sounds, the woofer reproduces back sounds, and wherein noise components of the back sounds are absorbed by a sound-absorbing material inserted to a back side of the woofer which is mounted to an interior of the front enclosure, for absorbing noise components of back sounds, good quality of the back sounds are discharged outwardly through a guide plate and an outlet .

18. A loudspeaker system structure mounted in a video appliance, comprising:

a triangular sound collecting portion formed over a back sound outlet and low/high-frequency sound outlets formed over a low-frequency sound outlet for collecting front-orienting sounds and back sounds reproduced from a woofer mounted to a rear portion of a front enclosure.

19. A loudspeaker system structure as claimed in claim 18, wherein an inside angle of the sound collecting portion is in a range of 20 degrees to 60 degrees.

20. A loudspeaker system structure as claimed in any preceding claim, wherein the front enclosure and the rear enclosure are made of plastic resins having a high density to compensate the tone quality of the low/-high frequency sounds reproduced from the enclosures of the loudspeaker.

21. A loudspeaker assembly for a video appliance comprising:

a front enclosure portion;

a rear enclosure portion engaged with the front enclosure portion to form a speaker enclosure;

at least one speaker mounted in the front enclosure portion and arranged to direct sound energy forwardly through the front enclosure portion, the speaker enclosure to the rear of the speaker providing a balancing space for inhibiting the production of secondary sound energy and vibration of the speaker enclosure by the speaker.

The Patent Office

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	EP 0598391 A2	(MATSUSHITA) see fig. 3	1
X	EP 0492919 A2	(SONY)	1
X	EP 0462571 A1	(MATSUSHITA) see figs. 6(d), 8	1
X	EP 0451991 A2	(MATSUSHITA) see figs. 1, 2, 4 to 6 & 8-10	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.